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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/632,277	08/01/2003	Chang Wei	124853 (GEGRC 0106 PA)	5091

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GENERAL ELECTRIC COMPANY
GLOBAL RESEARCH
PATENT DOCKET RM. BLDG. K1-4A59
NISKAYUNA, NY 12309

EXAMINER	
ROSENBERGER, FREDERICK F	

ART UNIT	PAPER NUMBER
2884	

DATE MAILED: 11/23/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	10/632,277	WEI ET AL.
	Examiner	Art Unit
	Frederick F. Rosenberger	2884

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 September 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-37* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-37* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *01 August 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Applicant's reply, filed 19 September 2005, has been received and entered. Accordingly, amendments have been made to the specification and claims 4, 6, 15, 17, 19, 20, 21, and 37. Claims 1-37 are currently pending in this application.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1, 4-5, and 9-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kingsley et al. (US Patent # 5,179,284) in view of Akai (US Patent # 5,378,894).

Kingsley et al. disclose a method for forming and an apparatus including a reflective and protective coating for a scintillator array **30** (Figure 1) for radiation imaging comprising:

A smoothening layer, in the form of pellicle layer **40** used to compensate for the surface roughness of the scintillator (column 3, lines 44-51);

A metallic reflective layer **52A** of silver (column 4, lines 11-14) with a thickness of 100-2000 Angstroms (column 4, lines 14-16);

A top layer **52B** of gold (column 4, lines 16-21) applied to the metallic reflective layer **52A** to provide an environmental barrier;

And a polymer encapsulant layer **54** of silicon potting compound (column 4, lines 57-63) with a thickness of 250-1000 μm.

Kingsley et al. further disclose that if the metallic reflective layer **52A** is made of a metal other than silver, than the top protective layer **52B** is not necessary. Thus, the top layer would instead be the polymer encapsulant layer **54**, per the limitations of claim 18.

Kingsley et al. also do not disclose that the reflective layer is provided on the sidewalls of the scintillator elements. Instead, Kingsley et al. only provide for the reflective/protective layers on the top surface of the scintillator, as illustrated in Figure 1.

Akai teaches a multi-layer reflective channel separators provided on the sidewalls of adjacent scintillator elements in an X-ray detector. With reference to Figure 2, Akai provides individual scintillators **11** with separator **120** comprising a white polyester sheet **1** and an aluminum film **2**. Akai notes that the purpose of the separator between adjacent scintillator elements is to effectively conduct the visible emitted light from the scintillator to corresponding photodiodes (column 1, lines 41-46).

Thus it would have been obvious for a person having ordinary skill in the art to modify the reflective layer of Kingsley et al. such that the layer coats the sidewalls as well as the top surface of the individual scintillator elements to better promote light guiding to respective photodiodes and thus prevent crosstalk between adjacent elements, as taught by Akai.

Kingsley et al. are further silent with regards to the claimed thickness and material of the smoothening layer. Kingsley et al. provide for a smoothening layer in the form of pellicle layer **40,** which is a 200-600 Angstroms thick layer of nitrocellulose, poly(para-xylene), organopolysiloxanepolycarbonate, or kryolite. Such materials satisfy the limitations of claim 5, depending on the polymer coating temperature and the emission wavelength. Further, it would have been an obvious matter of design choice to provide for a thicker smoothening layer dependent on the geometry and surface roughness of the scintillator, since such a modification would have involved a mere change in thickness of a component. A change in size is generally recognized as being within the level of ordinary skill in the art. In re Rose, 105 USPQ 237 (CCPA 1955).

Kingsley et al. also do not disclose that the polymeric encapsulant compound is one of the claimed materials or that the thickness of the polymeric encapsulant layer is 5-10 μm. However, it would have been an obvious matter of design choice to use one of the claimed materials with a thickness of 5-10 μm since applicant has not disclosed that the selection of the polymer encapsulant layer material and maximum thickness is critical to the invention and it appears that the invention would perform equally well with a thicker layer of silicon potting compound.

5. Claims 2-3, 6-8, and 21-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kingsley et al. and Akai, as applied to claims 1, 5, and 20 above, and further in view of Yoshida et al. (US Patent Application Publication # 2002/0196628).

The combination of Kingsley et al. and Akai disclose all of the limitations of the parent claims 1 and 5, as discussed above.

However, the combination of Kingsley et al. and Akai do not disclose that the smoothening layer could be etched.

Yoshida et al. teach that the substrate **A** (Figure 1), equivalent to the pellicle layer of Kingsley et al. and the smoothening layer of the claimed invention, may be etched via corona discharge or glow discharge, equivalent to an Argon plasma etch, to enhance the surface smoothness, thus providing a smooth first layer for the buildup of additional layers (paragraph 61).

Thus it would have been obvious for a person having ordinary skill in the art to modify the combination of Kingsley et al. and Akai to etch the smoothening layer to

enhance the smoothness of the smoothening layer for the buildup of subsequent layers, as taught by Yoshida et al.

With regards to the limitations of claim 6, the combination of Kingsley et al., Akai, and Yoshida et al. disclose the claimed invention except for the exact materials claimed. It would have been an obvious matter of design choice to use any polymer material that meets the limitations of claim 5 for the smoothening layer since applicant has not disclosed that the particular list of materials in claim 6 solves is critical to the invention and it appears that the invention would perform equally well with any polymer material that meets the limitations of claim 5.

The combination of Kingsley et al. and Akai are further silent with regards to an adhesion layer between the smoothening layer and the metal layer, as well as the associated characteristics of the adhesion layer.

Yoshida et al. teach an underlying layer **B** (Figure 1), equivalent to the adhesion layer of the claimed invention, which connects the metal layer **C** to the substrate film **A**. The adhesion layer is a thin metal film (paragraph 63) with a thickness in the range of 5-50 nm for connecting the silver metal layer to the substrate film. The use of a metal as the adhesion layer with a thickness in the given range provides a sufficient barrier effect while promoting good adhesion between the metal layer and the polymer film (paragraphs 12-13 and 73).

Thus it would have been obvious for a person having ordinary skill in the art to modify the combination of Kingsley et al. and Akai to provide a metal adhesion layer with a thickness in the range of 5-50 nm between the metal reflective layer and the

polymer smoothening layer to improve adhesion and protect the metal reflective layer, as taught by Yoshida et al.

With regards to claims 23-26, Kingsley et al. are further silent with regards to the manner in which deposition of the metal reflective layer occurs.

Yoshida et al. teach that the formation of the various metal layers **B**, **C**, and **D** (Figure 1) can be achieved using well known methods in the art, such as metal deposition from solution or vacuum film forming methods, including EB evaporation, ion beam assisted vapor deposition, sputtering, or other vacuum deposition methods (paragraph 67).

Thus, it would have been obvious for a person having ordinary skill in the art to modify the combination of Kingsley et al. and Akai such that the metal layer is deposited via a vacuum film forming methods or metal deposition from solution via chemical reduction since it was known in the art that such methods are equivalent for deposition of a metal layer, as taught by Yoshida et al.

6. Claims 27-28, 31-32, and 34-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kingsley et al. (US Patent # 5,179,294), in view of Akai (US Patent # 5,378,894) and Bahls (US Patent # 3,983,266).

Kingsley et al. disclose a method for forming a reflective and protective coating for a scintillator array **30** (Figure 1) for radiation imaging comprising the steps of applying a smoothening layer to the top surface of each scintillator in an array, in the form of pellicle layer **40** used to compensate for the surface roughness of the scintillator

(column 3, lines 44-51) and applying a metallic reflective layer **52A** of silver (column 4, lines 11-14) with a thickness of 100-2000 Angstroms (column 4, lines 14-16).

Kingsley et al. do not disclose that the reflective layer is provided on the sidewalls of the scintillator elements. Instead, Kingsley et al. only provide for the reflective/protective layers on the top surface of the scintillator, as illustrated in Figure 1.

Akai teaches a multi-layer reflective channel separators provided on the sidewalls of adjacent scintillator elements in an X-ray detector. With reference to Figure 2, Akai provides individual scintillators **11** with separator **120** comprising a white polyester sheet **1** and an aluminum film **2**. Akai notes that the purpose of the separator between adjacent scintillator elements is to effectively conduct the visible emitted light from the scintillator to corresponding photodiodes (column 1, lines 41-46).

Thus it would have been obvious for a person having ordinary skill in the art to modify the reflective layer of Kingsley et al. such that the layer coats the sidewalls as well as the top surface of the individual scintillator elements to better promote light guiding to respective photodiodes and thus prevent crosstalk between adjacent elements, as taught by Akai.

Kingsley et al. are further silent with regards to the use of a reducing agent and metal complex to form the metal reflective layer.

Bahls teaches a method for deposition of silver formed from a reducing agent of sorbitol (column 4, lines 8-14) and a silver amine complex (column 3, lines 55-57), wherein the reducing agent and the silver complex are applied separately via spray guns to the deposition substrate (column 4, lines 17-31). Bahls also teaches that

glucose (column 1, lines 26-29) or a solution of Rochelle salt (column 5, lines 10-11) can be used as a reducing agent.

Thus, it would have been obvious for a person having ordinary skill in the art to modify the combination of Kingsley et al. and Akai to use a reducing agent and metal complex to deposit a uniform silver layer in a highly efficient manner (column 1, lines 9-15), as taught by Bahls.

With regards to the degassing and washing/drying stages of claim 34, the inclusion of such steps would have been obvious to one of ordinary skill in the art at the time the invention was made since it is well known in the art that in the deposition of layer material bubbles could be trapped and need to be released to allow for a smooth uniform surface and that after processing the finished product should be washed and dried to remove unused starting materials and waste products.

With regards to the limitations of claim 37, regarding the combination of metal complex and reducing agent prior to application on the layers, such a step would have been an obvious matter of design choice since applicant has not disclosed that the prior combination of complex and agent solves any stated problem or is for any particular purpose and it appears that the invention would perform equally well with the agent and the complex applied separately.

7. Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kingsley et al., Akai, and Bahls, as applied to claim 27 above, and further in view of Krulik et al. (US Patent # 5,232,492).

The combination of Kingsley et al., Akai, and Bahls discloses all of the limitations of the parent claim 27, as discussed above. However, the combination of Kingsley et al., Akai, and Bahls is silent with regards to the metal complex being gold cyanide or gold thiosulfate. Instead, the combination uses silver amine.

Krulik et al. teach the use gold cyanide as the metal complex in the electroless deposition of a gold film (column 1,lines 20-23).

Thus, it would have been obvious for a person having ordinary skill in the art to use a gold cyanide metal complex instead of a silver amine metal complex so as to provide a gold reflective layer instead of a silver reflective layer, as taught by Krulik et al.

8. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kingsley et al., Akai, and Bahls, as applied to claim 27 above, and further in view of Kozlov et al. (US Patent # 6,455,175).

The combination of Kingsley et al., Akai, and Bahls discloses all of the limitations of the parent claim 27, as discussed above. However, the combination of Kingsley et al., Akai, and Bahls is silent with regards to the metal complex being rhodium metal complex. Instead, the combination uses silver amine.

Kozlov et al. teach the use of rhodium metal complex in the electroless deposition of a rhodium film (column 4, lines 8-10).

Thus, it would have been obvious for a person having ordinary skill in the art to use a rhodium metal complex instead of a silver amine metal complex so as to provide a rhodium reflective layer instead of a silver reflective layer, as taught by Kozlov et al.

9. Claim 33 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kingsley et al., Akai, and Bahls, as applied to claim 27 above, and further in view of Ferrell (US Patent # 6,180,524).

The combination of Kingsley et al., Akai, and Bahls discloses all of the limitations of the parent claim 27, as discussed above. However, the combination of Kingsley et al., Akai, and Bahls is silent with regards to the metal complex being copper amine. Instead, the combination uses silver amine.

Ferrell teaches the use of copper amine in the electroless or electroplating deposition of a copper film (column 1, lines 54-61).

Thus, it would have been obvious for a person having ordinary skill in the art to use copper amine instead of a silver amine metal complex so as to provide a copper reflective layer instead of a silver reflective layer, as taught by Ferrell.

Terminal Disclaimer

10. The terminal disclaimer filed on 20 June 2005 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of US Patent # 6898265 has been reviewed and is accepted. The terminal disclaimer has been recorded.

Response to Arguments

11. Applicant's amendments to the specification and the claims have successfully overcome the objection to the specification, the objections to the claims, and the 35 U.S.C. 112, second paragraph, rejection of claims 6, 17, 21, and 37, as detailed in paragraphs 3-5, 7, and 8 of the Office action mailed 23 March 2005.

12. Applicant's arguments filed 19 September 2005 have been fully considered but they are not persuasive.

In response to applicant's argument that there is no suggestion to combine the references (see page 12, last paragraph through page 13, first paragraph of Applicant's response), the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, Akai provides motivation for including a reflection layer on the sidewalls of the scintillator. Akai discloses that the separator between adjacent scintillators is used to conduct light produced in the individual scintillator elements to the respective photodiodes for improved sensitivity (column 1, lines 41-46). Although Akai refers to the layers between the individual scintillators as separators, it is clear from the disclosure that said

separator acts as a reflection layer (see for example, column 1, lines 55-63, and column 3, lines 1-20).

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). In this case, applicant argues that because Akai fails to show the particular layer structure on the sidewalls of the scintillator, motivation must be provided to modify the materials. However, Kingsley et al. do disclose a smoothening layer, a metallic reflective layer, and a top layer provided on the top surface of a scintillator array. Akai teaches that incorporating a reflection layer within the gaps between scintillator elements can attain improved sensitivity. Akai further illustrate that this multilayer format of polymer and metal layer provide improved sensitivity over conventional single layer reflective layers (see Akai's sensitivity comparison, column 5, line 45 – column 6, line 16). Thus, one of ordinary skill in the art would have been motivated to extend the multilayer reflection coating of Kingsley et al. into the gaps between adjacent scintillator elements to take advantage of the improved sensitivity taught by Akai.

Applicant argues that there would be no expectation of success from combining Akai with Kingsley et al. However, Akai does disclose increased performance from using a multilayer reflective coating on the sidewalls. It is unclear from applicant's arguments why one of ordinary skill in the art would not expect improved performance from using such a multilayer reflective coating on the sidewalls. Further, the use of

multilayer coatings covering adjacent scintillator elements has been well established within the art as providing improved performance. For example, applicant's attention is directed to Englert et al. (US Patent # 4,720,426), submitted on applicant's IDS, which clearly illustrates a multilayer reflective film coating a scintillator for use in a scintillator array. In such an arrangement (see Figures 6 and 8), a polymer layer, a metal reflecting layer, and a top layer are coated on the surfaces of the scintillator, which thereby enables improved performance by minimizing crosstalk between adjacent scintillator elements. One of ordinary skill in the art would expect a reasonable expectation of success of combining Kingsley et al. and Akai, given that Englert et al. had achieved improved performance by providing a multilayer reflective film between adjacent scintillator elements.

Finally, applicant seems to have misinterpreted the Akai reference as disclosing a blocking material of metallic thin film and at least two polymer sheets. Applicant's attention is directed to Figure 2A, wherein the scintillator $\mathbf{11_2}$ has one side surface a single polymer layer $\mathbf{1_{2R}}$ and a single metallic layer $\mathbf{2_{2R}}$. The second side surface of the scintillator is then coated with a second polymer layer $\mathbf{1_{2L}}$ and a second metallic layer $\mathbf{2_{2L}}$. Upon bonding with adjacent scintillators, the two metallic layers remain in contact within the gap. Thus, each sidewall of the scintillator is coated with a layer of polymer material and a layer of metal. Figure 3 further illustrates that adhesive agents **50** and **52** are included between the scintillator and the polymer layer as well as between the metal layers. Applicant also states that the metallic layer constitutes a blocking layer and implies that, as such, should not be considered a metallic reflective layer.

However, the metal layer of Akai is capable of reflecting light from the scintillator and thus blocking light from reaching the adjacent scintillator. Further, it is this combination of the polymer layer with the metallic layer in Akai that results in improved sensitivity over conventional single layer separators.

Conclusion

13. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Frederick F. Rosenberger whose telephone number is 571-272-6107. The examiner can normally be reached on Monday-Friday 8:00 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Porta can be reached on 571-272-2444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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